Unit 01: Introduction to Biology

Content Area: **Science**
Course(s):
Time Period: **Marking Period 1**
Length: **2 weeks**
Status: **Published**

Summary

The focus of this unit is to introduce students to Biology as a branch of Science centering around the study of living organisms. An understanding of key concepts that will allow students to have an understanding of, and make connections to, life science will be developed. Building on students' previous science knowledge, various cross-disciplinary scientific concepts, as well as the Scientific Method of Inquiry, the characteristics of life, and concepts of microscopy, will be reviewed, investigated, and applied. The local and global biological impacts of climate change will be introduced.

Revised July 2021

LA.W.9-10.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
LA.W.9-10.1.A	Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among claim(s), counterclaims, reasons, and evidence.
LA.W.9-10.1.E	Provide a concluding paragraph or section that supports the argument presented.
LA.W.9-10.2	Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
LA.W.9-10.2.A	Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.
LA.W.9-10.2.B	Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic.
LA.W.9-10.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
LA.W.9-10.8	Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the usefulness of each source in answering the research question; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and following a standard format for citation (MLA or APA Style Manuals).
LA.W.9-10.9	Draw evidence from literary or nonfiction informational texts to support analysis, reflection, and research.
LA.WHST.9-10.1	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant sufficient textual and non-textual evidence.

MA.S-IC.B	Make inferences and justify conclusions from sample surveys, experiments, and observational studies
MA.S-ID.C.9	Distinguish between correlation and causation.
MA.S-MD.A	Calculate expected values and use them to solve problems
CRP.K-12.CRP6.1	Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP7.1	Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.
CRP.K-12.CRP12.1	Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.
SCI.HS.LS1.B	Growth and Development of Organisms
SCI.HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
SCI.HS-LS1-1	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
SCI.HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
SCI.HS-LS1	From Molecules to Organisms: Structures and Processes
TECH.9.4.2.CT	Critical Thinking and Problem-solving
TECH.9.4.2.CT.2	Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
TECH.9.4.2.TL.2	Create a document using a word processing application.
	Planning and carrying out in 9–12 builds on K–8 experiences and progresses to include investigations that provide evidence for and test conceptual, mathematical, physical, and empirical models.
	Use a model based on evidence to illustrate the relationships between systems or between components of a system.
	Developing and Using Models

Constructing explanations and designing solutions in 9–12 builds on K–8 experiences and progresses to explanations and designs that are supported by multiple and independent student-generated sources of evidence consistent with scientific ideas, principles, and theories.

Systems and System Models

Developing and Using Models

Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.

Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.

Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.

Assessment does not include interactions and functions at the molecular or chemical reaction level.

Modeling in 9–12 builds on K–8 experiences and progresses to using, synthesizing, and developing models to predict and show relationships among variables between systems and their components in the natural and designed worlds.

Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.

Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.

Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.

Systems and System Models

Constructing Explanations and Designing Solutions

Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales.

Planning and Carrying Out Investigations

Essential Questions / Enduring Understandings

Essential Questions:

How does pseudoscience differ from natural science?

How are scientific theories and laws formed?

How is the Scientific Method used to logically answer a question, support/not support a hypothesis, and/or prove/disprove a claim?

How can experimental data be analyzed and presented to answer a question, support/not support a hypothesis, and/or prove/disprove a claim?

How can evidence and reasoning be used to prove/disprove and/or argue for/against a claim?

What are the local and global biological impacts of climate change?

Enduring Understandings:

Basic scientific concepts contribute to general science knowledge and understanding of everyday phenomena.

Biology contributes to natural science.

Climate change impacts biological systems.

Objectives

Students will know Key Vocabulary: natural science, pseudoscience, scientific theory, scientific law, observation, inference, scientific method, inquiry, hypothesis, variable, conclusion, biology, organism, microscope, cell theory.

Students will know the difference between natural science and pseudoscience.

Students will know the difference between scientific theories and scientific laws.

Students will know the characteristics of life.

Students will know the local and global biological impacts of climate change.

Students will be skilled at making observations and inferences.

Students will be skilled at formulating hypotheses for various experiments.

Students will be skilled at logically using the Scientific Method of Inquiry to carry out an experiment.

Students will be skilled at choosing and naming appropriate variables and groups to carry out investigations.

Students will be skilled at creating and/or following an experimental procedure.

Students will be skilled at analyzing and presenting experimental data using tables and graphs.

Students will be skilled at composing conclusions based on evidence.

Students will be skilled at constructing claims using evidence and reasoning.

Learning Plan

Unit Notes: Students will keep detailed notes in a specific notebook as the questions guiding the unit learning goals are answered through lectures and various activities.

Sponge Animal Experiment: Students will complete a full lab investigation to review how to carry out the steps of the Scientific Method to answer an experimental question and make a claim based on evidence and with reasoning.

CER - Claim, Evidence, Reasoning: Students will practice making claims based on observations and inferences and providing the evidence and appropriate reasoning to support those claims.

Amoeba Sisters Video Worksheet *Characteristics of Life*: Students will be introduced to the characteristics of all living things through a video and complete a worksheet activity to highlight the main points.

Characteristics of Life Reading: Students will read about the characteristics of life and create their own notes/study guide, highlighting the main points and specific examples.

Biological Impacts of Climate Change Brainstorming Activity: Students will be asked to brainstorm and discuss various biological impacts of climate change that they have personally seen or experienced, at the local and global levels, as an introduction to the topic.

Assessment

Formative:

Do Now Questions

Exit Ticket Questions

Whole Class Discussion Participation

Small Group Discussion Participation

Think-Pair-Share Participation

Individual Student Questions/Responses

Independent Tasks (*Characteristics of Life; CER*)

Labs (*Sponge Animal Experiment*)

Summative:

Formal Lab Report (*Sponge Animal Experiment*)

Unit Test

Quizzes (*The Nature of Science*)

Benchmark:

CP Biology Midterm Exam

Alternative Assessments:

Guided Formal Lab Report

Unit Study Guide/Guided Test

Presentation on Basic Biology Concepts

Materials

Textbook: *Biology* (Glencoe Science) by Alton Biggs

Unit Learning Goals Sheet

Technology: computers for student and teacher, SmartBoard projector

Teacher Slide Presentations

Amoeba Sisters Videos

Whiteboard + Accessories

Guided Notes/Worksheets

Study Guide

Lab Outline

Personal Protective Equipment: safety glasses, gloves

Lab Equipment: beakers, water, ice, water kettle, thermometers, sponge animal capsules, timers/stopwatches,

stirring rods

Graphing paper, rulers, colored pencils/markers

Integrated Accommodations and Modifications

See attached document.

https://docs.google.com/spreadsheets/d/1uDlwQcgdvbrOcLnMAKouOe1gQph5rWDWxM74UFeuACM/edit?usp=sharing